FACT SHEET FOR NPDES PERMIT WA-002449-0

FACILITY NAME: City of Everett, Water Pollution Control Facility

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the State of Washington on the basis of Chapter 90.48 RCW which defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty (30) days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the public notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	City of Everett
Facility Name and Address	Everett Water Pollution Control Facility 4027 4th Street South East Everett, Washington 98205
Type of Treatment:	Combined Aerated/Facultative Lagoon System Trickling Filter/Solids Contact System
Discharge Location	Snohomish River Lagoon System (Outfall 015) Latitude: 48° 00' 15" N Longitude: 122° 10' 38" W Trickling Filter/Solids Contact System (Outfall 025) Latitude: 47° 59' 29" N Longitude: 122° 10' 44" W Port Gardner Bay (Outfall 100) Latitude: 47° 58' 10" N Longitude: 122° 14' 48" W
Water Body ID Number	WA-07-1010

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

HISTORY

Prior to the construction of the Everett Water Pollution Control Facility in 1960, the collected sewage was discharged directly into Port Gardner Bay and into the Snohomish River. Since the initial construction of the treatment plant in 1960, the plant has undergone a series of plant improvements to arrive at the current configuration.

The Everett Water Pollution Control Facility is situated on a 350-acre land parcel owned by the City on Smith Island, east of the Snohomish River. The site is bordered by Interstate 5 and the Snohomish River on the west and on the south, and by Union Slough on the east. The plant is located within the Snohomish River flood plain and is protected from flooding by a diking system.

The service area encompasses an area of approximately 28,000 acres with a population of approximately 144,000. Including the City of Everett, three other water districts convey wastewater to the Everett Water Pollution Control Facility. The Silver Lake Water District sends 90% of its sewage to the Everett system; the Mukilteo Water District sends 100% of its sewage to Everett; and the Alderwood Water District sends 11% of its sewage to the Everett system.

In addition to the domestic sewage, the treatment plant functions as the regional septage disposal facility.

The population served is projected to increase from a base of 112,313 in 1990 to approximately 182,063 in 2020. Presented in the following table is a summary of the population and flow projections.

Year	Population	Maximum Winter Flow (mgd)	Average Winter Flow (mgd)
1990	112,313	19.00	17.33
1995	128,105	25.59	24.06
2000	143,906	28.78	27.02
2005	152,749	30.55	28.7
2010	161,592	32.32	30.3
2015	171,827	34.37	32.3
2020	182,063	36.41	34.2

In recognition of the increase in influent flow and loadings due to the sudden growth in Snohomish County that have exceeded flow projections identified in the *1987 Engineering Report on Sewage Treatment Plant Expansion*, the City has submitted re-rating evaluations to increase the "25.5 million gallons per day rated capacity" of the plant. These reports are:

- *Everett Water Pollution Control Facility Flow and Waste Load Assessment Report and Plant Capacity Re-rating Evaluation*, May 12, 1993, Brown and Caldwell Consultants
- *Everett Water Pollution Control Facility Flow and Waste Load Assessment Report and Plant Capacity Re-rating Evaluation*, June 21, 1994, 1994 Update, Brown and Caldwell Consultants
- *Everett Water Pollution Control Facility Re-rating and Effluent Mixing Zone Study*, April 1996, Brown and Caldwell

On October 16, 2000, the Department of Ecology approved the *Everett Water Pollution Control Facility Re-rating and Effluent Mixing Zone Study*, April 1996. The revised "nameplate" capacity of the plant is 31.3 million gallons per day.

The City of Everett is currently in the process of upgrading and expanding the Water Pollution Control Facility to meet future flow and loading projections. The Facilities Plan and Basis of Design Report, dated April 2003, was submitted to Ecology for review on January 7, 2004.

The Everett Water Pollution Control Facility is ranked as an EPA major facility.

COLLECTION SYSTEM STATUS

The City of Everett wastewater collection began in 1890 with the installation of clay sewer pipe along Broadway between 34th and 11th Street. Major portions of the developed areas in the City of Everett are served by the sewer system, with only small areas served by septic systems. With the exception of a small area located at Railway Avenue near the Snohomish River in the north service area, the remaining un-sewered areas are located within the south service area.

The north end service area consists of approximately 6,500 acres of densely developed land east of Pigeon Creek #1, south and west of the Snohomish River, and north of 63rd Street. This area is served by 100 miles of combined sewer lines, which were laid primarily between 1890 and 1963. Maintenance effort for this service area is high due to its age. This area is highly developed with relatively high population densities.

The south service area encompasses approximately 21,500 acres of which approximately 10,000 acres lie outside of the City limits. Within the 11,500 acres that are located within the City limits, there are approximately 140 miles of sanitary sewer lines that were largely placed into service after 1960. Population densities within this south service area are considerably less than the north end and the area still contains large segments of land suitable for development. The remaining 10,000 acres outside of the City limits lie within the Silver Lake, Mukilteo, and Alderwood water districts. The sewerage within this area is conveyed through City trunk lines and lift stations to the Everett Water Pollution Control Facility. Currently, the collection system consists of over 300 miles of sewer mains, trunks, interceptors and laterals, and 36 active lift stations.

Combined Sewer Overflow (CSO)

The City of Everett has 13 combined sewer overflows located within the City limits with discharges of untreated sewage and storm water during periods of heavy precipitation events.

On November 2, 1987, the City of Everett submitted a Combined Sewer Overflow Control Plan to the Department of Ecology, which was approved on March 15, 1988. The CSO Control Plan recommended the construction of a system of new lift stations and interceptors to convey flows to the treatment plant on Smith Island. Improvements to the Snohomish River Outfalls were given the highest priority. The implementation cost was estimated to be $38,000,000.

The City has been implementing control measures since approval of the plan. Approximately 90% of the overflow volume has been intercepted along the Snohomish River. The City is currently evaluating control measures to capture the remaining 10% of the overflow volume along Port Gardner Bay.

Presented in the following table is a summary of the completed CSO control projects.

Project	Completion Date
20th Street Interceptor	1991
Southend Interceptor Extension	1992
North CSO Control Project	1993
Snohomish River CSO Interceptor	1994
Effluent Pump Station	1997
Lift Station #8 Capacity Increase	1999

The City has completed CSO control projects at all but four Port Gardner Bay CSOs. All of these projects were completed sooner than recommended in the 1988 CSO Control Plan. The remaining Port Gardner Bay CSOs will be controlled with an on-site treatment facility with discharges to the new Kimberly-Clark deep-water outfall. A draft facility plan for the on-site treatment facility has been submitted to Ecology for review.

TREATMENT PROCESSES

The Water Pollution Control Facility was constructed in 1960. It initially consisted of a 135-acre and a 27-acre, five-foot deep oxidation ponds. In 1971, a mechanically aerated lagoon and a chlorination facility were added to complete the plant as a secondary treatment plant. In 1984, a headworks facility was added to remove grit and debris. In 1989, additional aeration was added to the aeration ponds and a recirculation pond was added to increase the lagoon efficiency. In 1991, a 16-mgd trickling filter/solids contact plant was added to increase the plant capacity. This secondary mechanical plant runs parallel to the existing oxidation pond element of the lagoon system. In 1996, a 40-mgd effluent pumping station was added to the Lagoon System to provide continuous high flow discharge to the Snohomish River regardless of the river level. In 1996, two dechlorination facilities using sodium bisulfite were built--one for the lagoon system and one for the Trickling Filter/Solids Contact system.

Lagoon System

Currently, the treatment facility includes raw sewage pumping, mechanically cleaned bar screens, influent flow measurement, grit removal, grit washing, and two 15-acre, seven-foot deep partially mixed aerated lagoons operated in series. Over 30 floating mechanical aerators provide oxygen and mixing to the two lagoons. Wastewater from the aeration ponds flows by gravity to a 135-acre oxidation pond and a 27-acre polishing pond. The aeration and oxidation pond systems provide secondary treatment. From the polishing pond, the treated wastewater flows to the chlorine contact channel for chlorination with elemental chlorine followed by dechlorination with sodium bisulfite. Depending on the river flow and tide stage, dechlorinated effluent is discharged either by gravity flow or by pumping to the Snohomish River via a 16-port diffuser outfall (Outfall 015).

Trickling Filter/Solids Contact System

The Trickling Filter/Solids Contact treatment system provides a parallel secondary treatment system to the oxidation ponds. Wastewater from the aerated lagoons is pumped by two eight million gallons per day pumps to the top of two trickling filters. Filtrates from the filters enter the solid contact tank and mix with biological solids from the secondary clarifiers. Blowers maintain dissolved oxygen in the tank. Effluent from the contact tank is distributed evenly to two 105-foot clarifiers. Secondary sludge is recycled back to the solids contact/reaeration tank with the excess wasted to the first aerated lagoon. From the secondary clarifiers, the treated wastewater flows to the chlorine contact channel for chlorination with elemental chlorine followed by dechlorination with sodium bisulfite. After dechlorination, the effluent is discharged by gravity through a 12-port diffuser outfall (Outfall 025) to the Snohomish River.

The treatment facility functions as the regional septage disposal facility. Waste sludge from the Trickling Filter/Solids Contact system is re-deposited in the aerated cells for digestion.

Industrial Discharges

In addition to domestic sewage from residential and light commercial activities located within the service area, the treatment plant also receives pretreated industrial wastewater from permitted pretreatment facilities. The City of Everett received approval of the pretreatment program on June 26, 1987.

Presented in the following table is a listing of permitted pretreatment industries located within the City limits. Many of the permitted facilities discharge metal-bearing wastewater.

Industry	Flow (gallons/day)	SIC Code	Wastewater Characteristics
Airport Rd Transfer Station (ARTS)	5,000	4953	Metals, BOD, TSS
Ametech	777	3469	Metals, CN, O&G
ASARCO		1629	Metals
Boeing Commercial Airplane	1,620,000	3721	Metals, O&G
Cathcart Sanitary Landfill	144,000	4953	Metals, BOD, TSS
Community Transit (Hardeson)	10,000	4112	Metals, O&G, BOD, TSS
Community Transit (K. Park)	7,000	4172	Metals, O&G, BOD, TSS
Dura Coatings	Zero discharge	3471	
Everett Landfill	0-500,000	4953	Metals
Fluke (Evergreen)	69,300	3825	Metals, O&G
Fluke (Seaway)	19,772	3825	Metals
Achilles USA	31,477	3081	Metals, O&G, BOD, TSS
NAVSTA Everett	66,000	9711	Zinc
Overall Laundry Services	280,000	7218	Metals, BOD, TSS
The Railmakers NW	50	3446	Metals
Snohomish County Transfer	2,903	4953	Metals, BOD, TSS
TC Systems	5,527	3471	Metals, O&G, TSS
Truckcare	500	4212	Metals, BOD, TSS
Blue Streak Finishers, Ltd.	3,500	3471	Metals, O&G
CINTAS Laundry Services	250,000	7218	Metals, O&G, BOD, TSS
Port Chatham Seafood	39,845	2091	O&G, BOD, TSS
Total	**3,059,951**		

The Everett Water Pollution Control Facility is rated as a Class IV plant. Seven operators (Group II – IV) staff it from 7:30 a.m. to 4:00 p.m. Monday through Friday. Operators also work nonroutine, 4-hour shifts (7:30-11:30) on weekends and holidays for purposes of sample collection and meter readings only.

DISCHARGE OUTFALL

The Everett Water Pollution Control Facility consists of a lagoon system and a parallel trickling filter/solids contact system. The two treatment systems currently have separate outfall diffuser discharges into the Snohomish River.

Lagoon Outfall (Outfall 015)

The 48-inch diameter lagoon outfall enters the river about 900 feet west of the polishing pond and about one mile downstream of the trickling filter/solids contact facility. The river is approximately 350 feet wide at the location of the outfall. The diffuser is located at approximately -8 feet below mean lower low water datum. The diffuser is approximately 36 feet long and has sixteen 10-inch risers spaced 2.5 feet apart. Effluent discharges horizontally through pinch check valves.

Trickling Filter/Solids Contact Outfall (Outfall 025)

The 48-inch diameter trickling filter/solids contact outfall is located about one mile upstream of the lagoon outfall. The river at the outfall location is approximately 450 feet wide; the outfall diffuser extends approximately 200 feet into the river at a depth of -16 feet below mean lower low water datum. The diffuser is approximately 35 feet long and has twelve 10-inch risers spaced 2.5 feet apart. Effluent discharges horizontally through pinch check valves.

Port Gardner Bay Outfall (Outfall 100)

In September 1997, Brown and Caldwell Engineers completed a study *Feasibility Study to Route Everett Wastewater Effluent to a Combined Everett/Kimberly-Clark Outfall.* The study evaluates the feasibility of routing and discharging Everett Water Pollution Control Facility treated effluent via the Kimberly-Clark Everett Facility to Port Gardner Bay rather than discharging into the Snohomish River. The Phase I engineering study, *Engineering Report, Port Gardner Outfall Replacement Project*, June 1999, CH2MHILL, proposes to construct a new 54-inch pipeline to convey the combined Kimberly-Clark Everett Facility and City of Everett flows for discharge in Port Gardner Bay at a depth of approximately 350 feet. The lagoon outfall (Outfall 015) will be used for dry and wet season discharges; the trickling filter/solids contact outfall (Outfall 025) will be maintained for hydraulic emergency use only. Everett will conduct routine flushing of Outfall 025 to scour sediments that have collected on the diffuser. The routine scouring will be conducted during high river flow periods to ensure that the diffuser remains open and operational for emergency events. The results of dilution modeling indicate the City of Everett and Kimberly-Clark effluents will both achieve necessary mixing to meet both the acute and chronic water quality standards. The City anticipates this deep-water marine outfall to be operational by September 2004.

RESIDUAL SOLIDS

The treatment of wastewater at the Everett Water Pollution Control Facility produces a variety of solids. Grit and screenings are collected from the headworks, scum is removed from the inlet area of the aerated lagoons, waste secondary sludge is collected from the trickling filter/solids contact facility, and digested sludge is collected from the bottom of the aerated lagoons.

Dewatered grit material, screenings, and scum are collected and transported to the Roosevelt Landfill in Klickitat County for disposal. Digested biosolids collected in the aerated lagoons are removed about every two years by a private contractor and recycled in accordance with federal, state, and local regulations. Biosolids harvested from the aerated lagoons meet Class A or Exceptional Quality criteria established in state and federal biosolids regulations. In 2002, 3200 dry tons of biosolids were beneficially reused as a topsoil amendment in a landfill restoration project, on hybrid poplar plantations, and by the residents of Snohomish County as a soil conditioner for lawns and gardens and in landscaping projects.

Presented in the following is a summary of the aeration lagoon biosolids characteristics from the 1st quarter 2004 sampling event. The values presented are reported on a "dry weight basis."

Parameter	Concentration (mg/kg)
pH (su)	6.8
Total Solids	10.4%
Volatile Solids	51.7%
Ammonia – N	4,055
Total Kjeldahl Nitrogen	29,800
Total Phosphate	13,500
Sulfate	4,525
Arsenic	17.0
Cadmium	11.9
Chromium	84.6
Copper	540
Lead	216
Mercury	2.92
Molybdenum	56.1
Nickel	56.5
Selenium	NA
Silver	30.2
Zinc	1,169

The December 2003 Hydrographic Survey estimates a volume of 100,000 cubic yards of biosolids in the two aerated lagoons. Approximately 4,000 dry tons will be removed in early summer 2004.

PERMIT STATUS

The previous permit for this facility was issued on October 30, 1992. The previous permit placed effluent limitations on 5-day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), pH, Fecal Coliform Bacteria, Chlorine, Cadmium, Copper, Lead, Mercury, Silver, and Zinc. The permit was appealed and the appeal was settled by Stipulation and Agreed Order PCHB No. 92-214. The Order allowed an interim effluent limit for copper of 30 micrograms per liter; an interim effluent limit for silver of 2.5 micrograms per liter; increased monthly mass discharge of BOD_5 to 2001 pounds per day for Outfall 025 (Trickling Filter/Solids Contact System) during August and September; required a redefinition of the mixing zones for the outfall; amended Condition S4.B to require initiation of planning requirements for maintaining adequate capacity when actual flow or waste load reaches 85% of design capacity for three consecutive months and modify Condition S5.F by replacing "not allow" with "shall not authorize."

An application for permit renewal was submitted to the Department on December 16, 1996, and accepted by the Department on May 6, 1997. The facility is currently operating under the terms and conditions of the expired permit, which was extended by Ecology on May 7, 1997.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

On August 16, 1993, the Ecology Watershed Assessments Section conducted an announced Basin Class II inspection of the facility. The inspection concluded minimal ammonia reduction throughout the treatment train and high residual chlorine concentrations in the effluent. It also identified copper and silver as pollutants of concern in effluent from the trickling filter/solids contact system. A Class I Compliance Evaluation (non-sampling) was conducted on October 28, 1997. Pretreatment compliance inspections were conducted in 1998, 1999, 2000, and 2001. The inspection reports are filed in the Permittee's records at the Northwest Regional Office.

During the history of the previous permit, the Permittee, with the exception of sporadic violations of BOD_5 limits, has remained in compliance, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department.

Effluent from the lagoon system has violated permit limits for BOD_5 during two months of 1998, three months of 1999, six months of 2002, and one month in 2003. There were two pH limit violations and one TSS limit violation in 2003. The BOD_5 violations have been attributed to nitrification in the lagoon system. In the current draft permit these effluent limits have been replaced with limits on $CBOD_5$, which better reflect the performance of the lagoon system.

The TF/SC system had one violation of the fecal coliform limit in 1997, and has reported no violations of any permit limits since then.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the NPDES permit application for the period June 1995 to May 1996. The Priority Pollutant scans presented in the table contain only detectable compounds and elements.

Table 1: Wastewater Characterization

	Parameter	Concentration
Influent	Flow (Lagoon) (Trickling Filter/Solids Contact)	0 – 24.4 mgd 0 – 15.8 mgd
	Biochemical Oxygen Demand (5-day)	44 – 490 mg/L
	Total Suspended Solids	58 – 560 mg/L
Effluent	pH	6.5 – 9.1
	Temperature	1.6 – 26.1° C
	Fecal Coliform	2 – 2,949/100 mL
	Biochemical Oxygen Demand (5-day)	5 – 94 mg/L
	Chlorine	ND – 460 µg/L
	Dissolved Oxygen	1.0 – 20.1 mg/L
	Total Suspended Solids	3 – 65 mg/L
	Ammonia	2.3 – 22.1 mg/L
	Copper	ND – 15 µg/L
	Lead	<1 – 6 µg/L
	Silver	0.3 – 1.3 µg/L
	Zinc	ND – 36 µg/L
	Isophorone (TF/SC)	1.8 µg/L
	bis (2-Ethylhexyl) phthalate (Lagoon & TF/SC)	2.6 & 2.9 µg/L

PROPOSED PERMIT LIMITATIONS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the surface water quality standards (Chapter 173-201A WAC), ground water standards (Chapter 173-200 WAC), sediment quality standards (Chapter 173-204 WAC), or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation**.** Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances, the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The existing permit specified a winter monthly average flow design capacity of 25.5 million gallons per day for the treatment plant (Lagoon System and Trickling Filter/Solids Contact System). In recognition of the increase in influent flow and waste loading due to the sudden growth in Snohomish County, the City submitted three plant re-rating studies, completed in 1993, 1994, and 1996 to Ecology for review and approval. The re-rated plant flow and BOD_5 loading values were derived based on an empirical method using treatment plant operating data for the period January 1990 to March 1994. The re-rating studies show the actual flow capacity of the plant is 31.3 million gallons per day.

On October 16, 2000, the Department of Ecology approved the April 1996 *Everett Water Pollution Control Facility Re-rating and effluent Mixing Zone Study*, in effect increasing the "nameplate" capacity of the plant from 25.5 million gallons per day to 31.3 million gallons per day.

The design criteria for this treatment facility are taken from the *Everett Water Pollution Control Facility, Re-rating and Effluent Mixing Zone Study*, April 1996 (amended January 2001) prepared by Brown and Caldwell. The re-rated flow and BOD_5 values are as follows:

Table 2: Design Standards for Everett Water Pollution Control Facility

Parameter	Existing Design Capacity	Re-rated Design Capacity
Facility Design Flow		
Maximum winter month	25.5 mgd	31.3 mgd
(October – July)	9.5 mgd (Lagoon)	15.3 mgd (Lagoon)
	16 mgd (TF/SC)	16 mgd (TF/SC)
Average summer month		
(August – September)	16.5 mgd	23.7 mgd
Influent BOD_5 Loading		
Maximum winter month (October – July)	29,440 lb/day	42,200 lb/day
Average summer month (August – September)	21,700 lb/day	41,300 lb/day
Influent TSS Loading		
Maximum winter month (October – July)	45,530 lb/day	58,400 lb/day
Average summer month (August – September)	31,000 lb/day	50,600 lb/day

For the summer months, August and September, the design flow criterion is re-rated at 23.7 mgd for the combined Lagoon System and Trickling Filter/Solids Contact System. This combined rating allows the City flexibility in the operation of its two systems.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of dischargers for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The Everett Water Pollution Control Facility receives storm water from combined sewers and can not meet the percentage removal requirements during wet weather. The dual nature of the facility results in two different secondary levels.

Lagoon System (Outfall 015)

Table 3: Technology-based Limits – Lagoon System (Outfall 015)

Parameter	Limit
pH	Shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
$CBOD_5$ (concentration)	Average Monthly Limit is the most stringent of the following: - 25 mg/L - may not exceed nineteen percent (19%) of the average influent concentration Average Weekly Limit = 40 mg/L
TSS (concentration)	Average Monthly Limit = 55 mg/L Average Weekly Limit = 83 mg/L

The TSS limits for the lagoon are calculated by methods presented in the *Permit Writer's Manual*. Effluent concentrations consistently achievable are based on 72 data points dating from June 1997. The average monthly limit of 55 mg/L is the concentration which has been achieved 95 percent of the time. The average weekly limit of 83 mg/L is equal to 1.5 times the average monthly limit. No percent removal applies to TSS.

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

- Monthly effluent $CBOD_5$ mass loading (lb/day) is calculated as the monthly design flow (15.3 mgd) x concentration limit (25 mg/L) x 8.34 (conversion factor) = $CBOD_5$ mass limit of 3,190 lb/day.
- Weekly average effluent $CBOD_5$ mass loading (lb/day) is calculated as the monthly design flow (15.3 mgd) x concentration limit (40 mg/L) x 8.34 (conversion factor) = $CBOD_5$ mass limit of 5,100 lb/day.
- Monthly effluent TSS mass loading (lb/day) is calculated as the monthly design flow (15.3 mgd) x concentration limit (55 mg/L) x 8.34 (conversion factor) = TSS mass limit of 7,020 lb/day.
- Weekly average effluent TSS mass loading (lb/day) is calculated as the monthly design flow (15.3 mgd) x concentration limit (83 mg/L) x 8.34 (conversion factor) = TSS mass limit of 10,590 lb/day.

Trickling Filter/Solids Contact System (Outfalls 025 and 100)

The Trickling Filter/Solids Contact System will operate under the standard secondary effluent limits taken from Chapter 173-221 WAC. The technology-based effluent limits for the Trickling Filter/Solids Contact System are as follows:

Table 4a: Technology-based Limits – Trickling Filter/Solids Contact System (Outfalls 025 and 100)

Parameter	Limit
pH	Shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
$CBOD_5$ (concentration)	Average Monthly Limit is the most stringent of the following: - 25 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 40 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
Outfall 100 only: Chlorine (concentration)	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

- Monthly effluent $CBOD_5$ mass loading (lb/day) is calculated as the maximum monthly design flow (16 mgd) x concentration limit (25 mg/L) x 8.34 (conversion factor) = $CBOD_5$ mass limit of 3,340 lb/day.
- Weekly average effluent $CBOD_5$ mass loading (lb/day) is calculated as the maximum monthly design flow (16 mgd) x concentration limit (40 mg/L) x 8.34 (conversion factor) = BOD_5 mass limit of 5,340 lb/day.
- Monthly effluent TSS mass loading (lb/day) is calculated as the maximum monthly design flow (16 mgd) x concentration limit (30 mg/L) x 8.34 (conversion factor) = TSS mass limit of 4,000 lb/day.
- Weekly average effluent TSS mass loading (lb/day) is calculated as the maximum monthly design flow (16 mgd) x concentration limit (45 mg/L) x 8.34 (conversion factor) = TSS mass limit of 6,000 lb/day.

The technology-based monthly average limitation for chlorine is derived from standard operating practices. The Water Pollution Control Federation's Chlorination of Wastewater (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/liter chlorine residual is maintained after fifteen minutes of contact time. See also Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal and Reuse, Third Edition, 1991. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/liter chlorine limit on a monthly average basis. According to WAC 173-221-030(11)(b), the corresponding weekly average is 0.75 mg/liter.

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established surface water quality standards. The Washington State surface water quality standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the state of Washington's water quality standards for surface waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a-receiving water while remaining protective of aquatic life. Numerical criteria set forth in the water quality standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The State was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA, 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

ANTIDEGRADATION

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

MIXING ZONES

The water quality standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control, and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

DESCRIPTION OF THE RECEIVING WATER

The facility discharges to the Snohomish River Estuary, which is designated as a Class A marine receiving water in the vicinity of the two outfalls. The new outfall (100) will discharge to Port Gardner Bay, which is also designated as Class A marine water. Other nearby point source outfalls include Marysville wastewater treatment plant, Lake Stevens Sewer District wastewater treatment plant, Snohomish wastewater treatment plant, Tulalip Tribes wastewater treatment plant, and Kimberly-Clark Everett discharges. Significant nearby non-point sources of pollutants include several diking district discharges. Characteristic uses include the following:

> water supply; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA, 1992).

The two Snohomish River outfalls are located within an estuary boundary defined by a salinity of one part per thousand (‰) at Mean Higher High Water and at an average annual low flow of 6,577 cubic feet per second. The Class A marine water criteria will apply for dissolved oxygen and aquatic life where the Snohomish River TMDL model predicts salinity of 1‰ or greater. For the Environmental Protection Agency's National Toxics Rule, freshwater criteria will be applied to waters with salinity less than 1‰; saltwater criteria will be applied in waters with salinity greater than 10 ‰; and the more stringent criteria will be applied in waters between 1 and 10 ‰. Port Gardner Bay is classified as Class A marine water.

Criteria for these waters are summarized below:

Snohomish River:

Fecal Coliforms	200 organisms/100 mL maximum geometric mean [WAC 173-201A-130(99)], Specific classification – Freshwater
Dissolved Oxygen	Marine water – shall exceed 6.0 mg/L. When natural conditions, such as upwelling, occur causing the dissolved oxygen to be depressed near or below 6.0 mg/L, natural dissolved oxygen levels may be degraded by up to 0.2 mg/L by human-caused activities.
Temperature	Marine water – shall not exceed 16.0° C due to human activities. When natural conditions exceed 16.0° C, no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3° C.
pH	Marine water – 7.0 to 8.5 standard units with a human-caused variation within the above range of less than 0.5 units.
Turbidity	Shall not exceed 5 NTU over background turbidity when the background is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background is more than 50 NTU.
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

Port Gardner Bay:

Fecal Coliforms	14 organisms/100 mL maximum geometric mean
Dissolved Oxygen	Shall exceed 6.0 mg/L. When natural conditions, such as upwelling, occur causing the dissolved oxygen to be depressed near or below 6.0 mg/L, natural dissolved oxygen levels may be degraded by up to 0.2 mg/L by human-caused activities.
Temperature	Shall not exceed 16.0° C due to human activities. When natural conditions exceed 16.0° C, no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3° C.
pH	7.0 to 8.5 standard units with a human-caused variation within the above range of less than 0.5 units.
Turbidity	Shall not exceed 5 NTU over background turbidity when the background is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background is more than 50 NTU.
Toxics	No toxics in toxic amounts for numeric criteria for toxics of concern for this discharge

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls, which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and defined in Section S1.E. of the permit.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of dye studies and the EPA WASP5 and PLUMES models. The critical dilution factors including reflux have been determined to be (*Everett Water Pollution Facility, Re-rating and Effluent Mixing Zone Study, April 1996, Brown and Caldwell;* and Memorandum on Revised Dilution Modeling for Everett TF/SC Outfall, Cosmopolitan Engineering Group, October 10, 2000):

Critical Dilution Factors – Lagoon System (Outfall 015)

	Acute	Chronic
Aquatic Life	6.4	14.2
Human Health, Carcinogen		14.2
Human Health, Non-carcinogen		14.2

Critical Dilution Factors – Trickling Filter/Solids Contact System (Outfall 025)

	Acute	Chronic
Aquatic Life	7.3	15.6
Human Health, Carcinogen		15.6
Human Health, Non-carcinogen		15.6

The mixing zone and dilution factors for the Port Gardner Bay Outfall (Outfall 100) will be determined according to Special Condition S9. Predicted dilution factors are over 600:1.

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as CBOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The critical condition for the Snohomish River main channel is the seven-day average low river flow with a recurrence interval of 20 years (7Q20). Ambient data at critical conditions in the vicinity of Everett's two Snohomish River outfalls (Outfalls 015 and 025) were based on the Snohomish River Estuary Total Maximum Daily Load Study. The TMDL considered both historical data and field data collected from an intensive monitoring study conducted in August and September 1993 and from a confirmation study in August 1996.

The impacts of dissolved oxygen deficiency, chlorine, ammonia, metals, and other toxics were determined as shown below, using the dilution factors described above.

BOD_5--Under critical conditions there was a prediction of a violation of the dissolved oxygen criterion for the receiving water (see the discussion on $CBOD_5$). The Ecology Watershed Assessments Section recommended the implementation of waste load allocations for ammonia (nitrogenous biochemical oxygen demand) and carbonaceous biochemical demand to be protective of the dissolved oxygen criterion. For this permit, the BOD_5 effluent limit will be eliminated and be replaced by $CBOD_5$ and ammonia effluent limits.

$CBOD_5$--The impact of the carbonaceous biochemical oxygen demand to the Snohomish River was modeled by Ecology Watershed Assessments Section using an EPA-supported model, WASP5. The results of the assessments are presented in:

Snohomish River Estuary Dry Season TMDL Study – Phase I, Water Quality Model Calibration, July 1995, Washington State Department of Ecology

Snohomish River Estuary Dry Season TMDL Study – Phase II, Water Quality Model Confirmation and Pollutant Loading Capacity Recommendations, June 1997, Washington State Department of Ecology

Snohomish River Estuary Dry Season TMDL Study – Phase II, Technical Addendum Number 1, January 1998, Washington State Department of Ecology

Snohomish River Estuary Total Maximum Daily Load, Submittal Report, August 1999, Washington State Department of Ecology

Snohomish River Estuary Total Maximum Daily Load, Supplement, August 1999, Washington State Department of Ecology

Snohomish River Estuary Dry Season TMDL Study – Phase II, Technical Addendum Number 2, July 1999, Washington State Department of Ecology

WASP5 was used to simulate the hydrodynamics and water quality of the estuary system at the critical 7Q20 river flow condition under changing tides with steady state pollutant loading conditions. The model predicted for existing discharges under critical conditions, the dissolved oxygen concentrations at low ebbing and high slack tide in a large portion of the lower river and estuary were found to be below the Marine Class A criteria. To meet the allowable anthropogenically-caused dissolved oxygen deficit of 0.2 milligrams per liter, Ecology Watershed Assessments Section recommended waste load allocation for ammonia and carbonaceous BOD be established for wastewater treatment plants for Everett, Lake Stevens Sewer District, Marysville, and Snohomish.

In July 1999, the Ecology Watershed Assessments Section using new data collected by the Snohomish Regional Water Quality Association revised the recommended waste load allocations for the 5-day carbonaceous biochemical oxygen demand and ammonia for the Snohomish River Estuary. Presented in the following table are the recommended waste load allocations for the City of Everett Water Pollutant Control Facility.

Everett WPCF	**Daily Maximum**	
	Ammonia lb/day	**$CBOD_5$ lb/day**
Lagoon	876	1,668
Trickling Filter/Solids Contact	667	494
Total	1,543	2,162

When the Port Gardner Bay outfall is operating, there will be no discharge into the Snohomish River from the TF/SC system. Therefore, the total load allocations for ammonia and $CBOD_5$ have been used for the maximum daily limits for the lagoon system. Average monthly limits were calculated using methods from EPA, 1991.

Temperature--The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at critical condition. The receiving water temperature at the critical condition is 14.7° C (*Snohomish River Estuary Dry Season TMDL Study – Phase II*, Station ID SNO20) and the effluent temperature is 20.1° C. The predicted resultant temperature at the boundary of the chronic mixing zone is 15° C, and the incremental rise is 0.3° C.

Under critical conditions there is no predicted violation of the water quality standards for surface waters. Therefore, no effluent limitation for temperature was placed in the proposed permit.

pH--Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 will assure compliance with the water quality standards for surface waters.

Fecal Coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 milliliters and a dilution factor of 14.2 for the Lagoon System (Outfall 015) and 15.3 for the Trickling Filter/Solids Contact System (Outfall 025).

Under critical conditions, there is no predicted violation of the water quality standards for surface waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the water quality standards for surface waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: chlorine, ammonia, copper, lead, silver, zinc, isophorone, and bis (2-ethylhexyl) phthalate. A reasonable potential analysis (see Appendix C) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

The determination of the reasonable potential for chlorine, ammonia, copper, lead, silver, zinc, isophorone, and bis (2-ethylhexyl) phthalate to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C) at the critical condition. The critical condition in this case occurs at high slack tide at the 7Q20 low river flow. The parameters used in the critical condition modeling are as follows:

Treatment System	Acute	Chronic
Lagoon System	6.4	14.2
TF/SC System	7.3	15.6

These dilution factors incorporated the measured and modeled reflux in the receiving water. A receiving water temperature of 14.7° C and a pH of 7.67 were used to evaluate the ammonia impacts.

No valid ambient background data were available for cyanide and chlorine. Valid ambient background data were available for ammonia, copper, and lead. Metals data were obtained by the Permittee during monthly sampling of the Snohomish River in the vicinity of the Everett Water Pollution Control Facility effluent outfalls.

Water quality criteria for metals in Chapter 173-201A WAC are based on the dissolved fraction of the metal.

The Permittee may provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Metals criteria may be adjusted on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge.

Metals criteria may also be adjusted using the water effects ratio approach established by USEPA, as generally guided by the procedures in *USEPA Water Quality Standards Handbook*, December 1983, as supplemented or replaced.

Calculations using all applicable data resulted in a determination that there is a reasonable potential for total chlorine residual from the Lagoon System effluent to cause a violation of water quality standards. Effluent limits were calculated using methods from EPA, 1991, as shown in Appendix C.

For other pollutants - ammonia, copper, lead, silver, zinc, isophorone, and bis (2-ethylhexyl) phthalate - calculations using all applicable data resulted in a determination that there is no reasonable potential to cause a violation of water quality standards. This determination assumes that the Permittee meets the other effluent limits of this permit. The existing metal effluent limits have therefore been eliminated from the proposed permit, based on new data that was not available during the development of the previous permit.

WHOLE EFFLUENT TOXICITY

The water quality standards for surface waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sub-lethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, $EC_{50,}$ IC_{25}, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria,* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Ecology Publications Distribution Center (360-407-7472) for a copy. Ecology recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

An effluent characterization for acute and chronic toxicity was conducted during the previous permit term. The Permittee is being asked to repeat this effluent characterization because of the long intervening period between the initial characterization and the addition of the dechlorination to the Lagoon System and to the Trickling Filter/Solids Contact System.

HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the State by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the effluent is likely to have chemicals of concern for human health. The discharger's high priority status is based on the discharger's status as a major discharger, and knowledge of data indicating regulated chemicals occur in the discharge.

A determination of the discharge's potential to cause an exceedance of the water quality standards was conducted as required by 40 CFR 122.44(d). The reasonable potential determination was evaluated with procedures given in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and the Department's *Permit Writer's Manual* (Ecology Publication 92-109, July 1994). The determination indicated that the discharge has no reasonable potential to cause a violation of water quality standards, thus an effluent limit is not warranted.

SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the sediment management standards. Discharges from both outfalls are into the Snohomish River in a navigation channel, which is routinely dredged to maintain navigation depths. The river velocity together with bedload transport and the routine dredging virtually prevent the accumulation of contaminated sediments in the vicinity of the outfalls.

A sediment study will be required for the new outfall into Port Gardner Bay.

INTERIM EFFLUENT LIMITATIONS

Evaluation of plant effluent data has shown under current treatment train configuration, the Everett Water Pollution Control Facility will not be able to the meet the recommended TMDL waste load allocations for the 5-day carbonaceous biochemical oxygen demand and ammonia. To comply with the TMDL waste load allocations, the City of Everett proposed to re-route the Trickling Filter/Solids Contact System effluent to Port Gardner Bay via the Kimberly-Clark deep-water marine outfall. This plant modification will reduce loading to the Lower Snohomish River and thereby bring the treatment plant into compliance with the TMDL-based effluent limits. The City of Everett and Kimberly-Clark Everett are proceeding with the design/construction of the Kimberly-Clark deep-water marine outfall. This outfall is scheduled to be operational by September 2004.

During the interim period prior to the startup of the deep-water outfall, the proposed permit contains performance-based mass limits for the summer low flow months of August and September for ammonia and $CBOD_5$. The concentration limits are based on aquatic life toxicity for ammonia and are technology-based for $CBOD_5$. After the startup of the deep water outfall, the final TMDL-based $CBOD_5$ and ammonia effluent limits will be effective.

Presented in the following is the basis for the derivation of the summer low flow performance-based limits for ammonia and $CBOD_5$. Results of the analysis are presented in Appendix C.

1. Calculated the correlation coefficient ρ using SPSS Base 10 using daily $CBOD_5$ and ammonia data for the period August 5, 1998 to September 30, 1998.
2. Calculated effective sample size n_e where n_e = daily variance / actual n-sample average variance.
3. Derived the 30-day concentration limits using the Ecology TSDCALC9.XLW spreadsheet.
4. Derived 30-day loading limits for the re-rated plant flow rates.
5. Derived the 7-day limits by multiplying the 30-day limits by 1.5.

The results of the performance-based effluent limit analysis are presented in the following table.

Parameters	Lagoon System		TF/SC System	
	$CBOD_5$	**NH_3**	**$CBOD_5$**	**NH_3**
Log-transformed Mean	2.538	2.981	1.597	2.567
Log-transformed Variance	0.0505	0.0068	0.0611	0.018
Correlation Coefficient, ρ	0.577	0.932	0.144	0.658
Monthly Sample Size, n	16	16	16	16
Effective Sample Size, n_e	4.812	1.406	12.196	3.86
Average Monthly	15	22	6	15
mg/L; lb/day	2,000	2,900	380	980
Average Weekly	23	33	9	22
mg/L; lb/day	3,000	4,350	570	1,470

During the summer months of August and September, the proposed permit contains a "bubble" allocation for the Lagoon System and the Trickling Filter/Solids Contact System. The "bubble" allocation is applicable to $CBOD_5$, TSS, and ammonia. Under the "bubble" allocation, a permit limit is defined to be violated when $CBOD_5$, TSS, or ammonia mass loadings from the Lagoon System and the Trickling Filter/Solids Contact System, added together, exceeds the specified permit limit. This "bubble" allocation allows the City flexibility in the operation of its two systems.

TSS mass loading is included in the "bubble" limits because the approved design flow for the summer months is a combined flow from the Lagoon and TF/SC systems. The limits were calculated based on the TSS concentration limits for the Lagoon and TF/SC systems and a maximum total flow of 23.7 mgd.

[Lagoon design flow (15.3 mgd) x concentration limit (60 mg/L) x 8.34] + [TF/SC flow (8.4 mgd) x concentration limit (30 mg/L) x 8.34] = Monthly average TSS mass limit of 9,760 lbs/day.

[Lagoon design flow (15.3 mgd) x concentration limit (90 mg/L) x 8.34] + [TF/SC flow (8.4 mgd) x concentration limit (45 mg/L) x 8.34] = Weekly average TSS mass limit of 14,640 lbs/day.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated ground water quality standards (Chapter 173-200 WAC) to protect uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water. In the event the Permittee implements water reclamation projects that may impact the ground water, appropriate permit conditions will be incorporated by permit modification.

COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT ISSUED on October 30, 1992

Parameter	Existing Permit Limit	Proposed Interim Limit	Proposed Final Limit
Flow			
015 (Aug.-Sep.)	10.5 MGD		
025 (Aug.-Sep.)	8.0 MGD		
Biochemical Oxygen Demand (BOD_5)			
015 (Aug.-Sep.) Monthly Average Weekly Average	 33 mg/L 2,890 lbs/day 50 mg/L 4,380 lbs/day		
025 (Aug.-Sep.) Monthly Average Weekly Average	 30 mg/L 1,615 lbs/day 45 mg/L 3,000 lbs/day		
015 (Oct.-July) Monthly Average Weekly Average	 33 mg/L 2,614 lbs/day 50 mg/L 3,962 lbs/day		
025 (Oct.-July) Monthly Average Weekly Average	 30 mg/L 4,000 lbs/day 45 mg/L 6,000 lbs/day		
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)			
015 (Aug.-Sep.) Monthly Average Weekly Average		 25 mg/L 40 mg/L	
025 (Aug.-Sep.) Monthly Average Weekly Average		 25 mg/L 40 mg/L	
015+025 (Aug.-Sep.) Monthly Average Weekly Average		 2380 lbs/day 3570 lbs/day	
015 (Oct.-July) Monthly Average Weekly Average		 25 mg/L 3,190 lbs/day 40 mg/L 5,100 lbs/day	
025 (Oct.-July) Monthly Average Weekly Average		 25 mg/L 3,340 lbs/day 40 mg/L 5,340 lbs/day	
015 (July-Oct.) Monthly Average Weekly Average Daily Maximum			 25 mg/L 1,145 lbs/day 40 mg/L 2,162 lbs/day

Parameter	Existing Permit Limit	Proposed Interim Limit	Proposed Final Limit
100 (July-Oct.) Monthly Average Weekly Average			 25 mg/L 3,340 lbs/day 40 mg/L 5,340 lbs/day
015 (Nov.-June) Monthly Average Weekly Average			 25 mg/L 3,190 lbs/day 40 mg/L 5,100 lbs/day
100 (Nov.-June) Monthly Average Weekly Average			 25 mg/L 3,340 lbs/day 40 mg/L 5,340 lbs/day
Total Suspended Solids			
015 (Aug.-Sep.) Monthly Average Weekly Average	 63 mg/L 5,520 lbs/day 95 mg/L 8,320 lbs/day	 55 mg/L 83 mg/L	
025 (Aug.-Sep.) Monthly Average Weekly Average	 30 mg/L 2,000 lbs/day 45 mg/L 3,000 lbs/day	 30 mg/L 45 mg/L	
015+025 (Aug.-Sep.) Monthly Average Weekly Average		 9,120 lbs/day 13,740 lbs/day	
015 (Oct.-July) Monthly Average Weekly Average	 63 mg/L 4,991 lbs/day 95 mg/L 7,527 lbs/day	 55 mg/L 7,020 lbs/day 83 mg/L 10,590 lbs/day	
025 (Oct.-July) Monthly Average Weekly Average	 30 mg/L 4,000 lbs/day 45 mg/L 6,000 lbs/day	 30 mg/L 4,000 lbs/day 45 mg/L 6,000 lbs/day	
015 (July-Oct.) Monthly Average Weekly Average			 55 mg/L 7,020 lbs/day 83 mg/L 10,590 lbs/day
100 (July-Oct.) Monthly Average Weekly Average			 30 mg/L 4,000 lbs/day 45 mg/L 6,000 lbs/day
015 (Nov.-June) Monthly Average Weekly Average			 55 mg/L 7,020 lbs/day 83 mg/L 10,590 lbs/day

Parameter	Existing Permit Limit	Proposed Interim Limit	Proposed Final Limit
100 (Nov.-June) Monthly Average Weekly Average			 30 mg/L 4,000 lbs/day 45 mg/L 6,000 lbs/day
Fecal Coliform Bacteria (all discharges)			
Monthly Average Weekly Average	200 per 100 mL 400 per 100 mL	200 per 100 mL 400 per 100 mL	200 per 100 mL 400 per 100 mL
Total Ammonia (as N)			
015+025 (Aug.-Sep.) Monthly Average Weekly Average		 3880 lbs/day 5820 lbs/day	
015 (July-Oct.) Monthly Average Daily Maximum			 904 lbs/day 1,543 lbs/day
pH (all discharges)			
	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.
Total Chlorine Residual			
015 (Aug.-Sep.) Monthly Average Daily Maximum	 23 µg/L 2.01 lbs/day 59 µg/L	 16 µg/L 2.0 lbs/day 83 µg/L	
025 (Aug.-Sep.) Monthly Average Daily Maximum	 28 µg/L 1.87 lbs/day 72 µg/L	 20 µg/L 2.7 lbs/day 95 µg/L	
015 (Oct.-July) Monthly Average Daily Maximum	 23 µg/L 1.82 lbs/day 59 µg/L	 16 µg/L 2.0 lbs/day 83 µg/L	
025 (Oct.-July) Monthly Average Daily Maximum	 28 µg/L 3.73 lbs/day 72 µg/L	 20 µg/L 2.7 lbs/day 95 µg/L	
015 (July-Oct.) Monthly Average Daily Maximum			 16 µg/L 2.0 lbs/day 83 µg/L
100 (July-Oct.) Monthly Average Weekly Average			 500 µg/L 67 lbs/day 750 µg/L
015 (Nov.-June) Monthly Average Daily Maximum			 16 µg/L 2.0 lbs/day 83 µg/L
100 (Nov.-June) Monthly Average Weekly Average			 500 µg/L 67 lbs/day 750 µg/L

Parameter	Existing Permit Limit	Proposed Interim Limit	Proposed Final Limit
Cadmium			
015 (Aug.-Sep.) Monthly Average Daily Maximum	 1.1 µg/L 0.1 lbs/day 2.2 µg/L		
025 (Aug.-Sep.) Monthly Average Daily Maximum	 1.4 µg/L 0.09 lbs/day 2.7 µg/L		
015 (Oct.-July) Monthly Average Daily Maximum	 1.1 µg/L 0.09 lbs/day 2.2 µg/L		
025 (Oct.-July) Monthly Average Daily Maximum	 1.4 µg/L 0.19 lbs/day 2.7 µg/L		
Copper			
015 (Aug.-Sep.) Monthly Average Daily Maximum	 4.7 µg/L 0.41 lbs/day 9.5 µg/L		
025 (Aug.-Sep.) Monthly Average Daily Maximum	 4.7 µg/L 0.31 lbs/day 9.5 µg/L		
015 (Oct.-July) Monthly Average Daily Maximum	 4.7 µg/L 0.37 lbs/day 9.5 µg/L		
025 (Oct.-July) Monthly Average Daily Maximum	 4.7 µg/L 0.63 lbs/day 9.5 µg/L		
Lead			
015 (Aug.-Sep.) Monthly Average Daily Maximum	 12 µg/L 1.05 lbs/day 24 µg/L		
025 (Aug.-Sep.) Monthly Average Daily Maximum	 12 µg/L 0.80 lbs/day 24 µg/L		
015 (Oct.-July) Monthly Average Daily Maximum	 12 µg/L 0.95 lbs/day 24 µg/L		
025 (Oct.-July) Monthly Average Daily Maximum	 12 µg/L 1.60 lbs/day 24 µg/L		
Mercury			
015 (Aug.-Sep.) Monthly Average Daily Maximum	 0.46 µg/L 0.04 lbs/day 0.93 µg/L		

Parameter	Existing Permit Limit	Proposed Interim Limit	Proposed Final Limit
025 (Aug.-Sep.) Monthly Average Daily Maximum	 0.6 µg/L 0.04 lbs/day 1.2 µg/L		
015 (Oct.-July) Monthly Average Daily Maximum	 0.46 µg/L 0.04 lbs/day 0.93 µg/L		
025 (Oct.-July) Monthly Average Daily Maximum	 0.6 µg/L 0.08 lbs/day 1.2 µg/L		
Silver			
015 (Aug.-Sep.) Monthly Average Daily Maximum	 1.5 µg/L 0.13 lbs/day 3.0 µg/L		
025 (Aug.-Sep.) Monthly Average Daily Maximum	 1.5 µg/L 0.10 lbs/day 3.0 µg/L		
015 (Oct.-July) Monthly Average Daily Maximum	 1.5 µg/L 0.12 lbs/day 3.0 µg/L		
025 (Oct.-July) Monthly Average Daily Maximum	 1.5 µg/L 0.20 lbs/day 3.0 µg/L		
Zinc			
015 (Aug.-Sep.) Monthly Average Daily Maximum	 51 µg/L 4.46 lbs/day 103 µg/L		
025 (Aug.-Sep.) Monthly Average Daily Maximum	 62 µg/L 4.13 lbs/day 125 µg/L		
015 (Oct.-July) Monthly Average Daily Maximum	 51 µg/L 4.04 lbs/day 103 µg/L		
025 (Oct.-July) Monthly Average Daily Maximum	 62 µg/L 8.27 lbs/day 125 µg/L		

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring of biosolids quantity and quality is necessary to determine the appropriate uses. Sludge and biosolids monitoring is required by the current state pretreatment program and also by EPA under 40 CFR 503.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (July 1994).

As a pretreatment POTW, the City of Everett is required to have influent, final effluent, and biosolids sampled for toxic pollutants in order to characterize the industrial input. Sampling is also done to determine if pollutants interfere with the treatment process or pass through the plant to the sludge or the receiving water. The monitoring data will be used by the City of Everett to develop local limits which commercial and industrial users must meet.

LAB ACCREDITATION

With the exception of certain parameters, the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* The laboratory at this facility is accredited for General Chemistry, Trace Metals, and Microbiology.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems, the Permittee is required in permit Condition S.7 to store and handle all residual solids (grit, screenings, scum, sludge, biosolids, and solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of biosolids from this facility is regulated by U.S. EPA under 40 CFR 503 and Ecology under WAC 173-308. The disposal of solid waste is under the jurisdiction of the Snohomish County Health Department.

Requirements for biosolids monitoring and recordkeeping are included in this permit. This information is required under 40 CFR 503 and WAC 173-308.

PRETREATMENT

To provide more direct and effective control of pollutants discharged, the City of Everett has been delegated permitting, monitoring, and enforcement authority for industrial users discharging to their treatment system. The Department oversees the delegated Industrial Pretreatment Program to assure compliance with federal pretreatment regulations (40 CFR Part 403) and categorical standards and state regulations (Chapter 90.48 RCW and Chapter 173-216 WAC).

An industrial user survey is required to determine the extent of compliance of all industrial users of the sanitary sewer and wastewater treatment facility with federal pretreatment regulations [40 CFR Part 403 and Sections 307(b) and 308 of the Clean Water Act], with state regulations (Chapter 90.48 RCW and Chapter 173-216 WAC), and with local ordinances.

As sufficient data becomes available, the Permittee shall, in consultation with the Department, re-evaluate its local limits in order to prevent pass through or interference. Upon determination by the Department that any pollutant present causes pass through or interference, or exceeds established sludge standards, the Permittee shall establish new local limits or revise existing local limits as required by 40 CFR 403.5. In addition, the Department may require revision or establishment of local limits for any pollutant that causes an exceedance of the water quality standards or established effluent limits, or that causes whole effluent toxicity. The determination by the Department shall be in the form of an Administrative Order. In order to develop these local limits, the Department will provide environmental criteria or limits for the various pollutants of concern.

The Department may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern. Any permit modification is subject to formal due process procedures pursuant to state and federal law and regulation.

SPILL PLAN

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The proposed permit requires the Permittee to develop and implement a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs.

COMBINED SEWER OVERFLOWS

In accordance with RCW 90.48.480 and Chapter 173-245 WAC, proposed permit Condition S14.B requires the Permittee to submit an annual Combined Sewer Overflow (CSO) report and to update its CSO reduction plan at the time of permit renewal.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary, to meet water quality standards, sediment quality standards, or ground water standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit be issued for a period of five (5) years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992, *National Toxics Rule,* Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991, *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001.

1988, *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling,* USEPA Office of Water, Washington, D.C.

1985, *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water*, EPA/600/6-85/002a.

1983, *Water Quality Standards Handbook*, USEPA Office of Water, Washington, D.C.

Metcalf and Eddy.

1991, *Wastewater Engineering, Treatment, Disposal, and Reuse*, Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972, *Characterization of Stream Reaeration Capacity*, EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

1994, *Permit Writer's Manual,* Publication Number 92-109

Water Pollution Control Federation.

1976, *Chlorination of Wastewater*

Wright, R.M., and A.J. McDonnell.

1979, *In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division*, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page one of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public Notice of Application (PNOA) was published on May 16 and May 23, 1997, in the *Everett Herald* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department published a previous Public Notice of Draft (PNOD) on September 6, 2002, in the *Everett Herald* to inform the public that a draft permit and fact sheet were available for review. No comments from the public were received at that time. Based on changed circumstances, new data, and comments from the Environmental Protection Agency (EPA), the draft permit has been significantly revised and a new public comment period will be provided.

The Department published a Public Notice of Draft (PNOD) on May 15, 2004, in the *Everett Herald* to inform the public that a draft permit and fact sheet were available for review. Interested persons were invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents were available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments were mailed to:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 – 160th Avenue SE
Bellevue, WA 98008-5452

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 425-649-7201, or by writing to the address listed above.

This permit and fact sheet were compiled by Laura Fricke.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART--An acronym for "all known, available, and reasonable methods of prevention, control, and treatment."

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation--The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation--The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural, and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site run-off, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a-receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

$CBOD_5$--Carbonaceous Biochemical Oxygen Demand is a measure of the quantity of organic material present in an effluent that is utilized by bacteria. CBOD is determined by adding a nitrification inhibition agent to the biochemical oxygen demand test.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity--Clearing, grading, excavation, and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring--Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction, e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial User--A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference--A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) [including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to subtitle D of the SWDA], sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility--A facility discharging to surface water with an EPA rating score of >80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of <80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

Pass Through--A discharge which exits the POTW into waters of the state in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of state water quality standards.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day; or

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g., facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)--A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)--

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, non-contact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at http.www:wa.gov.ecology.

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CRITERIA.XLS

WATER QUALITY CRITERIA

NPDES Permit #WA-002449-0

SPREADSHEET CREATED BY D. NUNNALLEE, REV. 1-92 BY G. SHERVEY
Last revision date 9/03 | FILENAME:
FACILITY: City of Everett WPCF | RUN DATE 4/15/2004
PREPARED BY: Laura Fricke

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

	PRIOF	CAR	Water Quality Criteria				Human Health Criteria		Organoleptic	Metals Translators			
	ITY	CIN	Fresh		Marine				Effects	Freshwater		Marine	
Pollutant, CAS No. & Application Ref. No.	PLTNT	GEN?	acute	chronic	acute	chronic	Fresh	Marine		Acute	Chronic	Acute	Chronic
CADMIUM - 7440439 4M Hardness dependent	Y	N	0.75	0.35	42.00	9.3				0.943	0.943	0.994	0.994
COPPER - 744058 6M Hardness dependent	Y	N	4.26	3.23	4.80	3.10			1000.00	0.996	0.996	0.83	0.83
LEAD - 7439921 7M Dependent on hardness	Y	N	12.64	0.49	210.00	8.10				0.466	0.466	0.951	0.95
MERCURY 7439976 8M	Y	N	2.10	0.012	1.80	0.0250	0.14	0.15		0.85		0.85	
SILVER - 7740224 11M dependent on hardness.	Y	N	0.28	NA	1.90	NA				0.85		0.85	
ZINC- 7440666 13M hardness dependent	Y	N	32.95	30.08	90.00	81.00			5000.00	0.996	0.996	0.946	0.946
BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	Y	Y					1.8	5.9					
ISOPHORONE 78591	Y	Y					8.40	600					
AMMONIA unionized -see seperate spreadsheets for FW criter	N	N			233	35							
CHLORINE (Total Residual) 7782505	N	N	19	11	13	7.50							

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Everett tsdcalc11.xls
AMMONIAfw.XLS

AMMONIA WATER QUALITY CRITERIA CALCULATION

NPDES Permit #WA-002449-0

Calculation Of Ammonia Concentration and Criteria for fresh water. Based on EPA Quality Criteria for Water (EPA 400/5-86-001) and WAC 173-201A. Revised 1-5-94 (corrected total ammonia criterion). Revised 3/10/95 to calculate chronic criteria in accordance with EPA Memorandum from Heber to WQ Stds Coordinators dated July 30, 1992.

INPUT	
1. Ambient Temperature (deg C; 0<T<30)	14.7
2. Ambient pH (6.5<pH<9.0)	7.67
3. Acute TCAP (Salmonids present- 20; absent- 25)	20
4. Chronic TCAP (Salmonids present- 15; absent- 20)	15
OUTPUT	
1. Intermediate Calculations:	
Acute FT	1.44
Chronic FT	1.44
FPH	1.23
RATIO	14
pKa	9.57
Fraction Of Total Ammonia Present As Un-ionized	1.2366%
2. Un-ionized Ammonia Criteria	
Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)	146.6
Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)	32.0
3. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (mg NH3+ NH4/L)	11.9
Chronic Total Ammonia Criterion (mg NH3+ NH4/L)	2.6
4. Total Ammonia Criteria expressed as Nitrogen:	
Acute Ammonia Criterion as mg N	9.7
Chronic Ammonia Criterion as N	2.12

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Everett tsdcalc11.xls
REASPOT.XLS

REASONABLE POTENTIAL CALCULATION

NPDES Permit #WA-002449-0

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

CALCULATIONS

				State Water Quality Standard		Max concentration at edge of...												
Parameter	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	**LIMIT REQ'D?**	Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	
	Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*			*Pn*	*ug/L*	*CV*	*s*	*n*				COMMENTS
Ammonia (Total)			90.0000	9700.0	2120.0	3011.21	1406.60	NO	0.95	0.985	22100.00	0.31	0.30	204.00	0.85	6.4	14.2	Lagoon System
Cadmium	0.99	0.99		42.0	9.3	0.03	0.01	NO	0.95	0.981	0.33	3.20	1.56	157.00	0.51	6.4	14.2	Lagoon System
Chlorine				13.0	7.5	14.82	6.68	YES	0.95	0.997	550.00	3.05	1.53	1156	0.17	6.4	14.2	Lagoon System
Copper	0.83	0.83	0.6390	4.8	3.1	1.93	1.22	NO	0.95	0.981	12.09	0.28	0.27	157	0.89	6.4	14.2	Lagoon System
Lead	0.95	0.95	0.0238	210.0	8.1	0.64	0.30	NO	0.95	0.981	5.15	0.53	0.50	157	0.81	6.4	14.2	Lagoon System
Mercury	0.85			1.8	0.0	0.01	0.00	NO	0.95	0.981	0.11	12.50	2.25	157	0.38	6.4	14.2	Lagoon System
Silver	0.85			1.9	10000.0	0.13	0.07	NO	0.95	0.981	1.19	0.50	0.47	157	0.82	6.4	14.2	Lagoon System
Zinc	0.95	0.95		90.0	81.0	7.37	3.32	NO	0.95	0.981	58.47	0.38	0.37	157	0.85	6.4	14.2	Lagoon System
Ammonia (Total)			90.0000	9700.0	2120.0	2737.86	1353.36	NO	0.95	0.979	22000.00	0.33	0.32	141.00	0.88	7.3	15.3	TF/SC System
Cadmium	0.99	0.99		42.0	9.3	0.01	0.01	NO	0.95	0.981	0.20	8.80	2.09	157.00	0.41	7.3	15.3	TF/SC System
Chlorine				13.0	7.5	4.45	2.12	NO	0.95	0.997	124.00	1.71	1.17	1140	0.26	7.3	15.3	TF/SC System
Copper	0.83	0.83	0.6390	4.8	3.1	1.84	1.21	NO	0.95	0.981	12.30	0.19	0.19	157	0.92	7.3	15.3	TF/SC System
Lead	0.95	0.95	0.0238	210.0	8.1	0.39	0.20	NO	0.95	0.981	3.45	0.46	0.44	157	0.83	7.3	15.3	TF/SC System
Silver	0.85			1.9	10000.0	0.08	0.05	NO	0.95	0.981	0.93	0.65	0.59	157	0.77	7.3	15.3	TF/SC System
Zinc	0.95	0.95		90.0	81.0	5.26	2.51	NO	0.95	0.981	44.60	0.22	0.22	157	0.91	7.3	15.3	TF/SC System

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LIMIT.XLS

WATER QUALITY BASED
PERMIT LIMIT CALCULATIONS

NPDES PERMIT #WA-002449-0

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chron mixing zone.

Permit Limit Calculation Summary

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations

Statistical variables for permit limit calculation

PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)	Comments	WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	LTA Coeff. Var. (CV)	LTA Prob'y Basis	Limiting LTA	Coeff. Var. (CV)	AML Prob'y Basis	MDL Prob'y Basis	# of Samples per Month	
			Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L		ug/L	ug/L	ug/L	ug/L	decimal	decimal	ug/L	decimal	decimal	decimal	n	
Chlorine	6.40	14.20				13.00	7.50	**15.7**	**83.2**	**Lagoon**	83	106.50	7.7	15.2	3.05	0.99	7.7	3.05	0.95	0.99	30.00	1.00
	7.30	15.30				13.00	7.50	**19.5**	**94.9**	**TF/SC**	95	114.75	12.4	27.0	1.71	0.99	12.4	1.71	0.95	0.99	30.00	1.00

This spreadsheet calculates water quality based permit limits based on the two value steady state model using the State Water Quality standards contained in WAC 173-201A. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 99. Last revision date 9/98. Written by G. Shervey

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HUMAN-H.XLS

REASONABLE POTENTIAL CALCULATION FOR PROTECTION OF HUMAN HEALTH

NPDES Permit #WA-002449-0

Revised 3/00	Ambient Concentration (Geometric Mean)	Water Quality Criteria for Protection of Human Health	Max concentration at edge of chronic mixing zone.	LIMIT REQ'D?	Expected Number of Compliance Samples per Month	AVERAGE MONTHLY EFFLUENT LIMIT	MAXIMUM DAILY EFFLUENT LIMIT	Estimated Percentile at 95% Confidence		Max effluent conc. measured	Coeff Variation		# of samples from which # in col. K was taken	Multiplier	Calculated 50th percentile Effluent Conc. (When n>10)	Dilution Factor
Parameter	*ug/L*	*ug/L*	*ug/L*			*ug/L*	*ug/L*		*Pn*	*ug/L*	*CV*	**S**	*n*			
MERCURY - Lagoon	0.0000	0.15	0.00	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.98	0.11	12.50	2.2	157	0.01		14.2
BIS(2-ETHYLHEXYL) PHTHALATE - Lagoon	0.0000	5.9	0.46	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.05	2.60	0.60	0.6	1	2.49		14.2
BIS(2-ETHYLHEXYL) PHTHALATE - TF/SC	0.0000	5.9	0.47	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.05	2.90	0.60	0.6	1	2.49		15.3
ISOPHORONE - TF/SC	0.0000	600	0.29	**NO**	**1.00**	**NONE**	**NONE**	0.50	0.05	1.80	0.60	0.6	1	2.49		15.3

TFSC NH3

PERFORMANCE-BASED EFFLUENT LIMITS	EVERETT WPCF - TF/SC SYSTEM (EFFLUENT NH3)	
USE EXCEL TO PERFORM THE LOGNORMAL TRANSFORMATION		
AND CALCULATE THE TRANSFORMED MEAN AND VARIANCE		
FLOW RATE =	8	MGD
CORRELATION COEFFICIENT =	0.658	
LOGNORMAL TRANSFORMED MEAN =	2.5670	
LOGNORMAL TRANSFORMED VARIANCE =	0.0180	
NUMBER OF SAMPLES/MONTH FOR COMPLIANCE MONITORING =	16	
EFFECTIVE SAMPLE SIZE (ne) (USE 0 IF UNKNOWN) =	3.860	
E(X) =	13.1445	
V(X) =	3.138	
VARn	0.0047	
MEANn=	2.5737	
VAR(Xn)=	0.813	
MAXIMUM DAILY EFFLUENT LIMIT =	17.798	
AVERAGE MONTHLY EFFLUENT LIMIT =	15	MG/L
AVERAGE MONTHLY EFFLUENT LIMIT =	979	LB/DAY
AVERAGE WEEKLY EFFLUENT LIMIT =	22	MG/L
AVERAGE WEEKLY EFFLUENT LIMIT =	1469	LB/DAY

TFSC CBOD5

PERFORMANCE-BASED EFFLUENT LIMITS	EVERETT WPCF - TF/SC SYSTEM (EFFLUENT CBOD5)	
USE EXCEL TO PERFORM THE LOGNORMAL TRANSFORMATION		
AND CALCULATE THE TRANSFORMED MEAN AND VARIANCE		
FLOW RATE =	8	MGD
CORRELATION COEFFICIENT =	0.144	
LOGNORMAL TRANSFORMED MEAN =	1.5970	
LOGNORMAL TRANSFORMED VARIANCE =	0.0611	
NUMBER OF SAMPLES/MONTH FOR COMPLIANCE MONITORING =	16	
EFFECTIVE SAMPLE SIZE (ne) (USE 0 IF UNKNOWN) =	12.196	
E(X) =	5.0914	
V(X) =	1.633	
VARn	0.0052	
MEANn=	1.6250	
VAR(Xn)=	0.134	
MAXIMUM DAILY EFFLUENT LIMIT =	8.775	
AVERAGE MONTHLY EFFLUENT LIMIT =	6	MG/L
AVERAGE MONTHLY EFFLUENT LIMIT =	380	LB/DAY
AVERAGE WEEKLY EFFLUENT LIMIT =	9	MG/L
AVERAGE WEEKLY EFFLUENT LIMIT =	570	LB/DAY

LAGOON NH3

PERFORMANCE-BASED EFFLUENT LIMITS	EVERETT WPCF - LAGOON SYSTEM (EFFLUENT NH3)	
USE EXCEL TO PERFORM THE LOGNORMAL TRANSFORMATION		
AND CALCULATE THE TRANSFORMED MEAN AND VARIANCE		
FLOW RATE =	15.7	MGD
CORRELATION COEFFICIENT =	0.932	
LOGNORMAL TRANSFORMED MEAN =	2.9810	
LOGNORMAL TRANSFORMED VARIANCE =	0.0068	
NUMBER OF SAMPLES/MONTH FOR COMPLIANCE MONITORING =	16	
EFFECTIVE SAMPLE SIZE (ne) (USE 0 IF UNKNOWN) =	1.406	
E(X) =	19.7746	
V(X) =	2.668	
VARn	0.0048	
MEANn=	2.9820	
VAR(Xn)=	1.898	
MAXIMUM DAILY EFFLUENT LIMIT =	23.874	
AVERAGE MONTHLY EFFLUENT LIMIT =	22	MG/L
AVERAGE MONTHLY EFFLUENT LIMIT =	2896	LB/DAY
AVERAGE WEEKLY EFFLUENT LIMIT =	33	MG/L
AVERAGE WEEKLY EFFLUENT LIMIT =	4344	LB/DAY

LAGOON CBOD5

PERFORMANCE-BASED EFFLUENT LIMITS	EVERETT WPCF - LAGOON SYSTEM (EFFLUENT CBOD5)	
USE EXCEL TO PERFORM THE LOGNORMAL TRANSFORMATION AND CALCULATE THE TRANSFORMED MEAN AND VARIANCE		
FLOW RATE =	15.7	MGD
CORRELATION COEFFICIENT =	0.577	
LOGNORMAL TRANSFORMED MEAN =	2.5380	
LOGNORMAL TRANSFORMED VARIANCE =	0.0505	
NUMBER OF SAMPLES/MONTH FOR COMPLIANCE MONITORING =	16	
EFFECTIVE SAMPLE SIZE (ne) (USE 0 IF UNKNOWN) =	4.812	
E(X) =	12.9779	
V(X) =	8.724	
VARn	0.0107	
MEANn=	2.5579	
VAR(Xn)=	1.813	
MAXIMUM DAILY EFFLUENT LIMIT =	21.343	
AVERAGE MONTHLY EFFLUENT LIMIT =	15	MG/L
AVERAGE MONTHLY EFFLUENT LIMIT =	2004	LB/DAY
AVERAGE WEEKLY EFFLUENT LIMIT =	23	MG/L
AVERAGE WEEKLY EFFLUENT LIMIT =	3006	LB/DAY

APPENDIX D--RESPONSE TO COMMENTS

Comments on the permit and fact sheet were received from the City of Everett. The comments and the Department of Ecology's responses are as follows:

NPDES Permit Comments

Cover page (pg. 1): Water Body ID:

On the cover page of the permit it identifies the Water Body ID as WA-07-1010. This applies for the lower reach of the Snohomish River, but is not the correct ID for the Port Gardner location of Outfall 100. The correct Water Body ID should be provided.

Response: The Water Body ID for Port Gardner Water Bay is WA-PS-0030. It has been added to the cover page.

Cover page (pg. 1): Discharge Location:

There should be some mention in the permit of the change in TF/SC River Outfall designation from Outfall #015a to Outfall #025.

Response: The TF/SC outfall was designated Outfall 015a in previous permits. This caused confusion and computer system compatibility problems. In this permit the TF/SC outfall has been designated Outfall 025. The new Port Gardner Bay outfall will be designated Outfall 100, for consistency with the Kimberly-Clark NPDES permit. This information is incorporated into the fact sheet by means of this Response to Comments.

S1.A through D: TSS limits for lagoon:

The TSS concentration limits for the lagoon in S1.A, S1.B, S1.C and S1.D and, consequentially, the loading limits calculated from the concentration limits, do not meet Ecology's 95% compliance criteria for Technology-based Limits. An examination of FEN TSS results for the years 2002 and 2003 found TSS monthly averages for Outfall 015 exceeded 55 mg/L for 5 of the 24 months. This is a compliance rate of 79%. (The *Permit Writer's Manual* allows up to 75 mg/L 30-day and 112 mg/L 7-day averages for waste stabilization pond limits based on past performance.)

The elevated TSS levels were attributed to algae growth and on one occasion a *daphia* bloom. There was no deficiency in EWPCF maintenance or operation practices during these months and since these appear to be performance-based and not water quality-based presumably insignificant detrimental impacts to the receiving stream.

Response: The TSS limits were recalculated using the methods in the *Permit Writer's Manual* and using DMR data for monthly average TSS from 2001 through 2003. The following table shows the ranked data and corresponding percentiles.

TSS (mg/L)	*Rank*	*Percent*
68	1	100.00%
56	2	94.20%
56	2	94.20%
55	4	88.50%
55	4	88.50%
48	6	85.70%
45	7	82.80%
44	8	80.00%
36	9	77.10%
35	10	74.20%
34	11	71.40%
33	12	68.50%
31	13	60.00%
31	13	60.00%
31	13	60.00%
30	16	57.10%
28	17	48.50%
28	17	48.50%
28	17	48.50%
27	20	45.70%
26	21	42.80%
25	22	40.00%
24	23	28.50%
24	23	28.50%
24	23	28.50%
24	23	28.50%
23	27	25.70%
22	28	22.80%
21	29	17.10%
21	29	17.10%
16	31	14.20%
15	32	8.50%
15	32	8.50%
13	34	5.70%
12	35	2.80%
10	36	.00%

Using interpolation, the 95th percentile is 57.5. A rounded value of 60 mg/L is the monthly average limit and 1.5 * 60 = 90 mg/L is the weekly average limit.

The references to "footnote c," which relates to pH, following the Total Suspended Solids listing for the lagoon in Sections S1.A, S1.B, S1.C and S1.D Effluent Limitations tables are incorrect and need to be removed.

Response: Footnote references removed.

S1.A through D: $CBOD_5$ percent removal limits for lagoon:

The $CBOD_5$ percent removal limits for the lagoon in S1.A, S1.B, S1.C and S1.D may be incorrect. Absent specific information to derive the percent removal limits, the City believes the limit should say, "…or 35 percent of the monthly average influent concentration,…" as per WAC 173-221-050(6)(b) alternatively, should Ecology have reason to deem the 35% removal requirement for $CBOD_5$ inappropriate, the City requests that limits be calculated based on the provisions of WAC 173-221-050(3). Alternative or waived percent removal limits may be given for systems with combined sewers if requested by the applicant as discussed in the following passage taken from the Ecology *Permit Writer's Manual* page V-20:

3.4.1 Discussion of Section 050(3)

Facilities which receive flow from combined sewers during wet weather can qualify for alternative monthly percent removal limits. During such wet weather conditions, the facility may be excused from achieving any predetermined percent removal requirement or may have a percent removal limit which is lower than otherwise allowed. During rainfall events, sewage treatment facilities which serve combined sewers can receive widely fluctuating influent flow rates and influent pollutant concentrations. These fluctuations are due to the intrusion of storm water to the sewer system. In some situations the influent concentrations are so dilute that achieving 85% or any other predetermined percent removal per

Section 050(1) or (2) is not possible. The fluctuations can also cause inaccurate computation of the 85% removal requirement. In many cases, the wide fluctuations prevent the establishment of a minimum (below 85%) percent removal requirement which the treatment system would be expected to achieve regardless of any flow situation."

Response: The comment is correct. The $CBOD_5$ percent removal requirement during low river flow periods has been changed to 65% according to WAC 173-221-050(6)(b). The $CBOD_5$ percent removal requirement during high river flow periods has been removed based on WAC 173-221-050(3).

S1. C: Lagoon CBOD and ammonia-N limits:

The CBOD water quality-based limits for the lagoon outfall are protective of the receiving stream with respect to dissolved oxygen. There is technical basis in the TMDL model to express this oxygen demand as a combination of these two parameters. Further discussion of this matter is provided in fact sheet comments regarding Page 22.

Therefore, any combination of ammonia-N and $CBOD_5$ that meets the equivalent oxygen demand (EOD) is in compliance with the TMDL. The EOD is determined as follows:

Equivalent Oxygen Demand Calculation

One pound of ammonia-N is equivalent to 2.1 pounds of $CBOD_5$.

EOD is defined as (1.0 * (ammonia-N mass discharge)) + (2.1 * ($CBOD_5$ mass discharge)).

Therefore, the EOD limit should be (1.0 * 1,543) + (2.1 * 2,162) = 6,083 lb/day maximum daily limit, and (1.0 * 904) + (2.1 * 1,145) = 3,308 lb/day monthly avg.

These limits should be placed in Permit Section S1.C for Outfall 015, and the $CBOD_5$ and ammonia-N mass limits should be deleted.

Response: Effluent mass loading limits for $CBOD_5$ and ammonia are related because both of these substances exert an oxygen demand that affects dissolved oxygen levels in the river. Accordingly, an exchange of wasteload allocations between $CBOD_5$ and ammonia is allowable if the overall daily load remains constant. The City of Everett is requesting an exchange rate of 2.1 lbs. $CBOD_5$ for each 1 lb. of ammonia. Using this ratio, a reduction in the discharge of ammonia would allow for an increase in the discharge of $CBOD_5$. The calculation presented in the comment is incorrect, however.

*Equivalent $CBOD_5$ (lbs/day) = $CBOD_5$ (lbs/day)+ (2.1 * Ammonia (lbs/day))*

Where $CBOD_5$ and total ammonia are measurements from the same daily composite sample.

Using the TMDL allocations, the daily maximum limit for Equivalent $CBOD_5$ (lbs/day) is 2,162 lbs./day $CBOD_5$ + (2.1 * 1,543 lbs./day ammonia) = 5,402 lbs./day.

The equivalent monthly average limit is 1,145 lbs./day $CBOD_5$ + (2.1 * 904 lbs/day ammonia) = 3,043 lbs/day.

These limits have been placed in the permit.

S1.C and D: Outfall #100 Sample Locations:

CBOD, TSS and ammonia-N must be sampled prior to chlorination to make an assessment of Everett WCPF's discharge independent of Marysville's effluent. Samples for these parameters will be collected as effluent from the secondary clarifiers. Everett has proposed to Department of Ecology collection of fecal coliform samples at the EWPCF South Effluent Pump Station (SEPS) discharge when flow through the SEPS is low enough to provide adequate detention time for disinfection. As flows increase, detention time in the SEPS wet well will become inadequate and it will be necessary to utilize detention time in the pipeline for disinfection. Fecal coliform samples will then be taken at the Kimberly-Clark site prior to mixing with Kimberly-Clark's effluent.

Please specify Outfall #100 CBOD, TSS and ammonia-N sample location prior to SEPS in the permit and provide the option for fecal coliform sampling at either the SEPS or Kimberly-Clark locations.

Response: Section S2.A. Monitoring Schedule has been expanded to reflect the different sampling points.

S1.C and D: Outfall #100 Total Residual Chlorine:

The explanation in the fact sheet appears to assume the point of compliance for the Outfall #100 Total Residual Chlorine (TRC) limit is at the SEPS. Since at higher flows the SEPS will not provide 20 minutes of detention time, there must also be provisions for TRC sampling at Kimberly-Clark (K-C).

Everett has proposed to Ecology an operating range of 0.1-0.5 mg/L Total Chlorine at Kimberly-Clark in *Operating Guidelines and Procedures for Treated Effluent Re-use as Non-Contact Cooling Water* as protective of public health and the environment. To provide 0.1-0.5 mg/L TRC to K-C a dosage greater than 0.5 mg/L may be needed leaving the SEPS.

The TRC loading limit of 67 lbs/day assumes a TF/SC flow of 16 MGD. This does not take into account flow from Marysville WWTP that will enter the South Effluent Pump Station prior to chlorination of the combined Everett WPCF and Marysville WWTP effluent. The maximum estimated flow from Marysville is estimated at 4 MGD. Suggest calculating the monthly average TRC with 20 MGD flow resulting in a limit of 83 lbs/day.

Response: Sampling for chlorine residual may be done at the SEPS or at the Kimberly-Clark site; this is reflected in Section S2.A. Monitoring Schedule. Ecology policy allows for total residual chlorine limits to be expressed as concentration only; therefore, mass limits for chlorine have been removed from the permit.

S1.C and D: WET "limits":

Consider adding WET "limits" in S1.C and S1.D for both Outfalls #015 and #100. The "limits" should be a narrative that states:

"As described in S10.B and S11.B. WET limits are only implemented if characterization studies in S10.A and/or S11.A trigger the need for WET limits."

Response: Language describing WET limits has been added to S1.C. and S1.D.

S2.A: Influent and Effluent Monitoring:

Monitoring BOD_5 four times a week is not needed for compliance with limits. While conditions S4.A and S4.F require an understanding of BOD_5 loading, analysis once or twice a week should be sufficient since BOD_5 no longer pertains to compliance monitoring.

Alternatively, is it possible to drop BOD_5 completely and modify conditions S4.A and S4.F to require an understanding of $CBOD_5$ loading instead? Since $CBOD_5$ loading data will be collected as part of the permit requirement to evaluate the percent $CBOD_5$, a significant savings in testing costs could be realized by the City.

Response: The design influent loading parameters are based on the approved engineering documents and so must continue to include BOD_5. Influent testing for BOD_5 at a frequency of once per week should provide sufficient data to assess treatment plant loading.

S6.A.5.a: Pretreatment:

Please change "An updated nondomestic inventory" to "An industrial survey update."

Response: Wording changed.

S6.B.1: Metals Monitoring:

The requirement for measuring metals as "total" is different than "total recoverable." Total recoverable metals are the relevant measure for future evaluations of any need for water quality-based effluent limits for metals. "Total" is an appropriate method for sludge, but not for effluent.

Response: "Total recoverable" metals should be reported for influent and effluent testing. This has been added to the permit.

S6.B and S6.B.2: Sludge Sampling:

Monitoring Requirements include requirements for sludge sampling. It appears from context that the sludge sampled will be waste secondary sludge from the TF/SC process and not sludge from the lagoon system. Please clarify with the specific sampling location.

Response: The sludge sample for pretreatment program and NPDES permitting purposes should be taken from the TF/SC waste secondary sludge process. This has been clarified in the permit.

S6.D: Local Limit Development:

Change "becomes" to "become" in the first line.

Response: Wording changed.

S11.A: Toxicity Testing Reports Submittal Dates:

In S11.A, the date for submittal of the second written report should be December 1, 2005 instead of November 1, 2005. This would be consistent with the reporting dates in S10.A and also allow the same amount of time from the months of the testing for all the toxicity testing reports.

Response: Date changed.

S12.A: Testing Clarification:

Condition S12.A requires additional effluent testing on the final plant effluent. It should be modified to show that it applies to the final plant effluents for both the lagoon system and the TF/SC system.

Response: Wording changed.

S.14.C: Combined Sewer Overflow Reduction Plan Amendment

This condition requires submittal of a CSO plan amendment concurrent with application for renewal of the NPDES permit. The City of Everett submitted a draft CSO Facility Plan to DOE in November 2003. This facility plan will be finalized in 2004 and addresses all remaining uncontrolled CSOs in Everett.

Therefore, any CSO plan amendment would be unnecessary and redundant to the CSO Facility Plan. We request this condition be deleted.

Response: An amendment to the CSO reduction plan need not be an extensive document. The requirements of WAC 173-245-090(2) include an assessment of the effectiveness of the CSO reduction plan to date and a schedule of projects to be completed in the next five years. These items will still be relevant as long as there are uncontrolled CSOs.

S.14.D: Compliance Schedule:

This condition requires completion of construction necessary to control the last remaining uncontrolled CSOs by 12/31/08. This is an unnecessary acceleration of the City's CSO Control Plan that was approved by Ecology in 1988. This condition would require complete implementation of the CSO Control Plan within 20 years. The CSO Control Plan approved by DOE was based upon a 30-year rather than a 20-year implementation period. None of the earlier versions of the draft NPDES permit required CSO construction. In fact, it appears that Everett is being penalized because we voluntarily accelerated implementation of our CSO control program in the 1990s to take advantage of available federal and state funding assistance. We request DOE change this condition to read, " Complete pre-design for CSO control at PS04, PS05, PS06, and PS07 no later than December 31, 2008."

Response: This section has been changed to require the submission of final plans and specifications for this CSO project by December 31, 2008.

S14.E: Nine Minimum Controls:

The brief descriptions of the nine minimum controls in S14.E are neither compatible with nor representative of the much broader discussion in EPA's Nine Minimum Controls Guidance. For example, the second paragraph on page 3-1 of EPA's guidance states that any possible modifications to the collection system to maximize use of the collection system for wastewater storage need to be analyzed to be sure they do not cause other problems such as street and basement flooding. The City of Everett's 1998 CSO Control Plan documented that our existing collection system could not increase system storage without causing street and basement flooding. Condition 2 in S.14.E does not provide this leeway. We request that S.14.E be changed to say, "The Permittee must implement and document compliance with WAC 173-245 and US EPA CSO control policy (59 FR 18688). Compliance with the NMC shall be documented in the annual CSO report as required in S14.B."

Response: This condition is a brief statement of the Nine Minimum Controls, included to comply with EPA's requirements for NPDES permits. The EPA CSO control policy (50 FR 18688) and WAC 173-245 are referenced in the first sentence of this permit condition. No additional language is necessary.

Comments on the Fact Sheet

Page 4, Introduction:

The second paragraph of the introduction on page 4 identifies various applicable state regulations. The list should also include the Whole Effluent Toxicity Testing and Limits rule (Chapter 173-205 WAC).

Does the Water Body ID Number WA-07-1010 apply to all the discharge locations, or should there be a different Water Body ID number for Port Gardner?

There should be a note in the fact sheet of the change in TF/SC River Outfall designation from Outfall #015a to Outfall #025.

Response: The Water Body ID for Port Gardner Water Bay is WA-PS-0030. It has been added to the cover page. The TF/SC outfall was designated Outfall 015a in previous permits. This caused confusion and computer system compatibility problems. In this permit the TF/SC outfall has been designated Outfall 025. The new Port Gardner Bay outfall will be designated Outfall 100, for consistency with the Kimberly-Clark NPDES permit. This information is incorporated into the fact sheet by means of this Response to Comments.

Page 10, TF/SC Outfall (Outfall 025):

Please change "…a depth of –16 feet below mean lower low water datum." to "…a depth of 16 feet below mean lower low water datum."

Response: Correction noted. This information is incorporated into the fact sheet by means of this Response to Comments.

Page 15, Table 3:

The derivation of the percent removal for the CBOD technology-based limits in Table 3 needs explanation. Absent a specific basis for setting the percent removal requirement for $CBOD_5$, the percent removal requirement should be 65% as per WAC 173-221-050(6)(b), which means the effluent may not exceed 35% of the monthly average influent $CBOD_5$.

Alternatively, the City requests that the provisions of WAC 173-221-050(3) for attainable percent BOD_5 removal during wet weather for facilities that receive flows from combined sewers be applied to $CBOD_5$.

Response: The $CBOD_5$ percent removal requirement during low river flow periods has been changed to 65% according to WAC 173-221-050(6)(b). The $CBOD_5$ percent removal requirement during high river flow periods has been removed based on WAC 173-221-050(3).

The explanation for the derivation of the TSS concentration limits is insufficient. WAC 173-221-050(2)(a) provides for TSS limits to be 45 mg/L as a 30-day average and 65 mg/L as a 7-day average. WAC 173-221-050(2)(c) provides that notwithstanding the limits in (a), the discharge standards shall not be any less stringent than "effluent concentrations consistently achievable through proper operation and maintenance of the wastewater facility based upon an analysis of the past performance."

The *Permit Writer's Manual* provides a means of defining what is consistently achievable for an Average Monthly Limit based on what has been achieved 95 percent of the time, and then multiplying that by 1.5 to establish the Average Weekly Limit. The methodology is faulty in implementing the regulation because it establishes a limit that the historical monitoring shows was not consistently achieved, and no documentation is provided, or called for by the *Permit Writer's Manual*, to show that the highest 5th percentile represented times when there was improper operation and maintenance.

The appropriate TSS limits based on what the City has consistently achieved 100% of the time from January 1, 2000 to June 6, 2004 would be an AML of 68 mg/L and a 7-day average of 102 mg/L.

Response: The TSS limits for the lagoon system have been recalculated. See the response under the permit comments.

The pH limit in Table 3 for the lagoon system should note, "the range shall not be exceeded where such values are attributable to inorganic industrial contributions." This wording is relevant for lagoon systems and is shown correctly in the permit.

Response: Comment noted. This information is incorporated into the fact sheet by means of this Response to Comments.

Page 22, Table showing ammonia and $CBOD_5$ TMDL waste load allocations:

The limiting TMDL concern is dissolved oxygen and the purpose of the ammonia and $CBOD_5$ waste load allocations is to limit oxygen demand on the receiving stream. There is a technical basis in the TMDL model and precedent in the Snohomish Basin to regulate the discharge of these pollutants as equivalent oxygen demand (EOD) calculated as follows:

One pound of ammonia-N is equivalent to 2.1 pounds of CBOD5.

EOD is defined as (1.0 * (ammonia-N mass discharge)) + (2.1 * ($CBOD_5$ mass discharge)).

Therefore, the EOD limit should be (1.0 * 1,543) + (2.1 * 2,162) = 6,083 lb/day maximum daily limit, and (1.0 * 904) + (2.1 * 1,145) = 3,308 lb/day monthly avg.

These limits should be placed in Permit Section S1.C for Outfall 015, and the $CBOD_5$ and ammonia-N mass limits should be deleted.

Response: This exchange of $CBOD_5$ and ammonia is not automatic or required; it is included upon the request of the Permittee. See full discussion in the permit comment section above.

Page 22, Evaluation of temperature impacts:

The discussion of temperature impacts needs to also present an evaluation for Outfall #100. Suggested wording:

For Outfall 100, because the anticipated dilution factors are more than an order of magnitude greater than for Outfall 015, and because the discharge is to deep, colder water, the incremental rise will be even less.

Response: Comment noted. This information is incorporated into the fact sheet by means of this Response to Comments.

Page 22, Evaluation of fecal coliform impacts

The discussion of Fecal Coliform impacts needs to show that it also considered Outfall 100. This can be done by changing the first sentence as follows:

The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 milliliters and dilution factors of 14.2, 15.3 and an estimated dilution factor of 600 for Outfalls 015, 025 and 100.

Response: Comment noted. This information is incorporated into the fact sheet by means of this Response to Comments.

Pages 22-23, Evaluation of toxic pollutants:

The discussion of toxic pollutants needs to include an analysis for the Port Gardner outfall location (Outfall 100) as well. The estimated dilution factors for Outfall 100 could have an "*" and the following comment:

> * The dilution factors may be revised after an additional dilution study required in Special Condition S9 is completed and approved by Ecology.

The fact sheet notes that valid ambient background data were available for ammonia, copper, and lead. It should also acknowledge that ambient background data were available for silver, zinc, and ammonia.

> **Response:** Comment noted. This information is incorporated into the fact sheet by means of this Response to Comments.

Page 25, Sediment Quality:

The discussion of sediment quality needs an additional sentence for the Port Gardner outfall location, such as:

> Similarly, the discharge to the new outfall in Port Gardner Bay, with its much greater initial dilution, is not expected to violate the sediment management standards.

> **Response:** Comment noted. This information is incorporated into the fact sheet by means of this Response to Comments.

Page 45:

The figure showing the schematic of wastewater flow should be updated to reflect the new outfall, different outfall designations, and discharge rates.

> **Response:** The outdated schematic was removed from a previous draft of the fact sheet.